WASHINGTON
SCIENCE TRENDS

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Aircraft Nuclear Propulsion

Joint Committee on Atomic Energy will recommend shortly that the controversial nuclear airplane program might best be taken out from under Defense Department and Air Force control.

According to Congressional sources a majority of the influential Senate-House Committee will recommend that the program management be shifted to the Atomic Energy Commission or some other civilian agency or group with experience in handling technical developmental projects.

The proposal arises from inconclusive testimony before the Committee earlier this year in which the A-Plane program was both praised and condemned. Witnesses generally agreed, however, that the present management system and philosophy has failed to bring about the progress which could be expected after 14 years and nearly One Billion Dollars in appropriations.

Project is currently being reoriented away from any "fly-early" goal toward increased emphasis on advanced materials research and development -- a philosophy which may or may not bring future dividends in performance, while delaying by several years the advent of U.S. nuclear flight.

> The Committee, it is reported, believes this de-emphasis on military requirements strengthens the cause of those who argue that a civilian group can best manage a technical development program.

Stanford Linear Accelerator

Administration proposals to have the Government finance a $105 million linear electron accelerator at Stanford University, Palo Alto, Calif. failed to win approval before Congress adjourned and will be delayed until next February at the earliest.

AEC Chairman John McCone reportedly agreed to the delay because of what Congressional sources describe as a "number of unanswered questions" on the mammoth project.

Among the problems which were not answered to everyone's satisfaction were those of patent rights and royalties, program costs, the question of public vs. private power supply and potential technical "conflict of interest" on the part of a key official.

It is expected, however, that these problems can be solved by the time Congress returns next January.

Science Teaching Aids

National Science Foundation has approved 18 projects for grants of $189,000 to encourage new laboratory equipment for schools and college courses. Once equipment has been developed, grantees are expected to permit interested commercial suppliers to "enter negotiations for production and marketing." For further information on any of these projects, write Service Department, Washington SCIENCE TRENDS, 1120 National Press Building, Washington 4, D.C.

( ) Equipment students and teachers can make,including viscosimeter, dynamometer, galvanometer, vacuum-tube potentiometer, ph meter, mendelian-ratio computer and model of a carbon pile.

( ) Reliable inexpensive variable-speed memory drum, interval timers and psychogalvanometer.

( ) Inexpensive supersonic wind tunnel, with strain gages, built from government-surplus components.

( ) Manual of about 100 experiments for college courses in optics.

( ) Transparent overlay aids for use with an overhead projector to illustrate fundamental concepts of engineering graphics.

( ) Operating model to demonstrate principles of hemodynamics in verterbrate circulatory systems.

( ) An inexpensive opthalmosocope.

( ) New types of Christiansen filters and a relatively inexpensive spectrophotometer.

( ) Lab demonstration materials for an overhead projector, including cyclotron operation, electronic plotter and demonstration of motions of particles, measuring devices, spectra, electric circuits and fields.

( ) Electronic planetarium development and sound movies on satellite motion, gravitation and celestial mechanics.

( ) Inexpensive laboratory kits for biological studies.

( ) Teaching aids on the design and use of analog computers.

( ) Device for demonstrating nature of solids, liquids and gases, a new type of periodic chart, improved models of atoms, molecules, ions and crystals.

( ) "Building blocks" for building analytical chemistry instruments.

( ) Kit-style digital computer.

( ) Modified research apparatus for quantitative experiments on properties of waves.

( ) Teaching aids for studies of animal anatomy and embryology.

( ) Stereophotomicrographs and other preparations for animal structure studies at a sub-macroscopic level.

Flight-Load Data Processing Center

National Bureau of Standards has recommended several optional analog and digital systems for a proposed Air Force - Navy-National Aeronautics and Space Administration center for processing aircraft flight-load data. Plan envisions airborne recorders and a facility capable of processing at least 30,000 flight-hours of data annually.

Requirement - NBS views the need for adequate design criteria based on actual experience as "acute" - particularly because of accelerated demands for higher performance. No one now has the statistics which are required for the entire spectrum of loads encountered by the numerous types of aircraft in regular service ranging from extreme loads, occuring infrequently, to lesser loads which may occur frequently enough to cause serious structural failure after a few hundred or a few thousand hours.

Basic Approach - NASA has developed a basic approach which requires that airborne recorders develop continuous data on at least eight paramaters during flight -- impact and static air pressures, and the three accelerations along, and three angular velocities about, the three body axes of the aircraft. Data can be derived for calculating the component loads on major portions of the aircraft structure, such as a horizontal tail assembly. Statistics could be used for considering safe service life of existing aircraft, and probability curves could be derived to assist in future design.

Special Processing Center - NBS believes that a special-purpose computing facility, automatically processing flight data that have been recorded directly on magnetic tape, would be desirable. It would not only make possible an "enormous" increase in the flight-hours-per year that can be processed but would also deal with enough paramaters to provide more realistic criteria for design of aircraft and components.

Bureau recommends that processing at such a facility include preliminary editing, correction of measured accelerations to refer them to the center-of-gravity of the aircraft and the derivation of additional paramaters, such as Mach number, pressure altitude, helix angle, angular accelerations, and products of velocities. Accumulated statistics would be kept separately for each aircraft and mission category, with further separation of data taken during rough air conditions. About 14,000 tallies will result for each flight processed.

Several System configurations are recommended. In one, an analog computer is used for preliminary processing, with a digital tape prepared for use during the statistical phase. Programming studies show the entire task could be carried out on a digital computer but about half the task can be performed more economically with a relatively inexpensive analog computer. In either case, a high-speed modern digital computer would be required -- with preference given to general-purpose equipment, where possible.

Flake Laminate Research

Armour Research Foundation, in a report to the Army's Picatinny Arsenal, finds "high potential usefulness" for flake glass and resin bonded laminates. Laminates can be made with commercial flake which combine flexural strength of about 40,000 p.s.i. with flexural moduli of about six million p.s.i.

Some conclusions in a two year study:

* Flake glass laminates can be made which approach the flexural strength of fibrous glass laminates and at the same time are more rigid.

* Extremely high tensile strength, previously observed only in cylindrical filaments of glass and metal, can be obtained with glass flakes or ribbons. Flaw-free pyrex ribbons, four microns in thickness, resisted tensile stresses exceeding one million p.s.i.

* Physically and optically measurable properties of the flake are not different from those of the same glass in bulk.

* Suggested applications:

With Resin Bond - Aircraft and missile radomes, tank windows, electrical potting mixes, battery cases, instrument cases, rocket nozzles.

With Inorganic Bond - High-temperature radomes, electrical insulation, rocket nozzles and molded high-strength ceramic structures.

(For complete report write OTS, U.S. Department of Commerce, Washington 25, D.C. for PB 151 531 - Investigation of Flake Laminate. 22 pages. 75 cents)

Radio Transmission Losses

Boulder Laboratories, National Bureau of Standards, has devised a method for predicting the cumulative distribution with time of radio transmission loss at frequencies above 10 megacycles per second. Technique is expected to have important applications in design and allocation of commercial and military communication and navigation links.

Available information about terrain profiles and surface meteorological data are used. The method is based on standard atmospheres in which the radio refractive index decreases linearly with height for the first kilometer, then decreases exponentially.

According to NBS, at frequencies of 40 to 10,000 mc and distances out to and just beyond the radio horizon, the dominant propagation mechaniam is diffraction. At greater distances to 1,000 miles, the dominant mechanism is usually forward scatter, especially during winter afternoons. Estimates of median diffraction and scatter fields are given.

(For Complete Report, Write OTS, U.S. Department of Commerce, Washington 25, D.C. for NBS Technical Note 15. 83 pages. $1.50)

Free Government Patents

Here is a new listing of Government-owned patents now available for use by industry on a royalty-free basis. Subscribers desiring further information may write Service Department, Washington SCIENCE TRENDS, 1120 National Press Bldg., Washington 4, D.C. Inquiries will be referred to the appropriate Government Agency. There is no charge for this service.

( ) Boron Coating: This patent covers a method of coating metallic, glass or other surfaces with various types of boron.

( ) Alloys: A patent on alloys consisting essentially of thorium as the major ingredient with minor quantities of silicon and beryllium. Combines excellent hardness values with improved corrosion resistance.

( ) Flaw Detection: Covers apparatus and methods for the non-destructive testing of flaws in an electrically conductive test article, a technique said to be particularly applicable to Bundy tubing.

( ) Printed Circuit Conductors: Etching is said to be eliminated in this technique by which printed circuits are made from a stock metal-clad insulation support sheet. Product is useful in such electronic equipment as radios, television, missiles, computers and control systems.

( ) Electron Emitter: Under this patent an emitter for an electronic tube is made by depositing upon a metal base a coating of high porous magnesium oxide.

( ) Wind Tunnel Instrument: This device serves as a detector to indicate when the speed of a compressor shaft for a wind tunnel is at zero speed and can also control coupling and uncoupling.

( ) Dynamometer: The device covered by this patent is designed for acoustic bearing determination with a sound detection system.

( ) Lubricants: New chemical compounds -- alkyl esters of stearic acid -- are covered in this patent. The lubricating compositions are said to possess low pour points.

( ) Electronic Relay: A triggered transistor oscillator circuit designed to replace a sensitive D.C. relay for use in ordnance applications. Said to be shock and vibration resistant.

( ) Chassis Mounting: Rapid inspection and removal is said to be possible with this mounting rack construction for an electrical chassis for oscillators or amplifiers.

( ) Rapid Developer: The photographic developer covered in this patent is said to combine high speed with fine grain.

( ) Aircraft Latch Mechanism: A combined automatic and manual latch mechanism for releasing objects temporarily attached to aircraft such as auxiliary fuel tanks.

( ) Ceramic Pellets: This device produces spherical pellets of ceramic materials.

( ) Fiber Glass-Metal Joints: In this method, high strength joints can be made between woven glass fiber and metal in a warhead.

Publication Checklist

( ) Advanced Propulsion Systems a study by the AeroChem Research Laboratories for the Office of Naval Research aimed at evaluating the state of the art and estimating fruitful lines for future research. Covers such topics as free radicals, oxygen-atom recombination ramjet, ion propulsion and magnetogasdynamics. 91 pages. $2.50. (Write OTS, U. S. Department of Commerce, Washington 25, D.C. for PB 151 796)

( ) Electric Thrust Devices, a bibliography of references prepared for the Air Force in connection with a fundamental investigation of electrical power sources for electric thrust devices. Citations are arranged according to potential applications within or without space vehicles. 38 pages. $1.25. Write OTS, U.S. Department of Commerce, Washington 25, D.C. for PB 151 430)

( ) Military Air Transportation, A Congressional Report on what the executive branch of the Government has and has not done in regard to the military air transportation system. 29 pages. Single Copies Free. (Write Committee on Government Operations, U.S. House of Represenatives, Washington 25, D.C. for MATS Report)

( ) Standards, a new index of all Commercial Standards voluntarily adopted by industry to establish recognized quality requirements, including methods of testing, rating and grading. Includes such fields as chemicals, electrical and mechanical equipment, plastics, rubber and thermal insulation materials. Single copies free. (Write Commodity Standards Division, U.S. Department of Commerce, Washington 25, D.C. for Catalog No. 978)

( ) Batteries, a new catalog of technical reports listing all available Government research on storage, alkaline, nuclear and general types of batteries and battery chargers from 1933 to 1958. Single Copies Free. (Write OTS, U.S. Dept. of Commerce, Washington 25, D.C. for CTR-372)

( ) Biomedical Experiments, June, 1959 Congressional Briefing on space-monkey experiments. Just released. 18 pages. Free. (Write Committee on Science and Astronautics, New House Office Building, Washington 25, D.C. for Report No. 35)

( ) Research in Industry, a new Report on Funds for Research and Development in private industry covering the year 1957. 6 pages. Single copies free. (Write Information Office, National Science Foundation, Washington 25, D.C. for NSF Publication 59-46, August 1959)

( ) MOHO Project, the first report on projects aimed at drilling a hole through the earth's crust beneath the ocean. Includes preliminary engineering data. 20 pages. Single copies free. (Write Mr. Willard Bascom, AMSOC Committee, National Academy of Sciences, 2101 Constitution Avenue, N.W., Washington 25, D.C. for Pub. 717)

( ) Titanium, a report on certain aspects of metallurgical thermochemistry of titanium, and on substances and reactions that bear upon the magnesium, sodium and hydrogen-reduction processes employing titanium tetrachloride. 48 pages. 30 cents. (Write Supt. of Documents, Govt. Printing Office, Washington 25, D.C. for Pub. No. I 28.23:5490)